

Appendix G

Initial CHART Assessment for the Columbia River Chum Salmon ESU

CHART Participants

The CHART for this ESU consisted of the following NOAA Fisheries biologists: Ben Meyer (CHART Leader), Michelle Day, Dan Guy, Lynne Krasnow, Lance Kruzic, Nancy Munn, Mindy Simmons, Cathy Tortorici, and Rich Turner. This CHART assessment also benefitted from review and comments from the Oregon Department of Fish and Wildlife and the Washington Department of Fish and Wildlife.

ESU Description

The Columbia River chum ESU includes all naturally spawned populations of chum salmon in the Columbia River and its tributaries in Washington and Oregon (64 FR 14508; March 25, 1999). The following brief description is based largely on life history information and excerpts from the report of the Lower Columbia Fish Recovery Board (LCFRB 2003) and the Willamette/Lower Columbia River Technical Recovery Team's (TRT) recent review of historical population structure for this ESU (Myers et al. 2003).

Intensive monitoring of chum spawning escapement is conducted in three Washington tributaries in the lower Columbia basin—Grays River, Hardy Creek, and Hamilton Creek—and in the mainstem Columbia River near Ives Island. The latter three populations are located immediately downstream of Bonneville Dam. Chum salmon populations exist in other river systems of the lower Columbia, but are not consistently monitored and are assumed to be extremely low in abundance.

Chum salmon returning to the Columbia River are considered a fall run. Adult fall run chum salmon return to the Columbia River from mid-October through November, but apparently do not reach the Grays River until late October-early December. Spawning occurs in the Grays River from early November to late December. Fish returning to Hamilton and Hardy Creeks begin to appear in the tributaries in early November and their spawn timing is more protracted (mid-November-mid-January).

Chum seldom show persistence in surmounting river blockages and falls, which may be why they usually spawn in lower river reaches. Chum salmon spawn typically dig their redds in the mainstem or in side channels of rivers from just above tidal influence to nearly 60 miles (100 km) from the sea. They spawn in shallower, slower-running streams and side channels more frequently than do other salmonids. In some locations, subgravel flow (upwelled groundwater from seeps and springs) may be important in the choice of

redd sites by chum salmon. Many Columbia River chum have been found to select spawning sites in areas of upwelling groundwater. New spawning grounds for chum were recently discovered along the northern Columbia River shoreline near the I-205 Glen Jackson Bridge where groundwater upwelling occurs. A significant number of chum returning to Hamilton Creek spawn in a spring-fed channel, and portions of the Grays River and Hardy Creek populations spawn in the area of springs. Hundreds of chum salmon once returned to spawn within spring-fed areas along Duncan Creek; efforts have been completed to restore passage to these productive areas and protect the springs that feed them.

Chum do not have a clearly defined smolt stage, but are nonetheless capable of adapting to seawater soon after emerging from gravel. Downstream migration may take only a few hours or days in rivers where spawning sites are close to the mouth of the river. Historical information concerning the timing of chum salmon emigration in the lower Columbia River is limited. Recent seining projects conducted in the Grays River and at Ives Island indicate outmigration occurs from March through May and peaks from mid-April to early May.

Chum salmon juveniles, like other anadromous salmonids, use estuaries to feed before beginning long-distance oceanic migrations. However, chum and ocean-type chinook salmon usually have longer residence times in estuaries than do other anadromous salmonids. The period of estuarine residence appears to be the most critical phase in the life history of chum salmon and may play a major role in determining the size of the subsequent adult run back to fresh water. Chum salmon spend more of their life history in marine waters than other Pacific salmonids. Juveniles feed primarily on plankton and epibenthic organisms, while subadults feed on similar items as well as larger prey (including fishes and squid). Most adults mature and spawn as 3-year old fish.

CHART Area Assessments and Initial Conservation Value Ratings

The Willamette/Lower Columbia Technical Recovery Team (TRT) has placed groups of populations in this recovery planning domain into “strata” intended to assist in evaluating ESU-wide recovery scenarios (McElhany et al. 2002). The strata are based on major life history characteristics (e.g., species run types) and ecological zones. The Columbia River chum salmon ESU inhabits three ecological zones (Coast Range, Cascade, and Columbia Gorge) and contains a single life history type (fall run), resulting in a total of three strata for this ESU (McElhany et al. 2002). Recovery planning will likely emphasize the need for a geographical distribution of viable populations across the range of such strata/regions in an ESU (Ruckelshaus et al. 2002, McElhany et al. 2003). Therefore, as

part of its assessment the CHART considered the conservation value of each HUC5 in the context of the populations within these strata.

The CHART assessment for this ESU addressed six subbasins containing 19 occupied watersheds, as well as the lower Columbia River rearing/migration corridor. Subbasins were chosen as freshwater critical habitat units because they present a convenient and systematic way to organize the CHART's watershed assessments for this ESU.

Unit 1. Middle Columbia/Hood Subbasin (HUC4# 17070105)

The Middle Columbia/Hood subbasin is located in the eastern portion of the Columbia River gorge of Oregon and Washington. Occupied watersheds in this subbasin are contained in Hood River, Multnomah, and Wasco counties in Oregon, and Klickitat and Skamania counties in Washington. The subbasin contains 13 watersheds, three of which are occupied by this ESU (almost exclusively as rearing/migration habitat). Occupied watersheds encompass approximately 669 mi² and 282 miles of streams. This subbasin may be the upstream extent of the species' distribution in the entire Columbia River basin (Myers et al. 2003). Fish distribution and habitat use data from the Washington Department of Fish and Wildlife (WDFW) identify approximately 26 miles of occupied riverine habitat in the watersheds, including a 22-mile segment of the Columbia River (WDFW 2003). The CHART amended the WDFW distribution data with recent information indicating that chum salmon may occupy the lower reaches of the White Salmon River (Ehlke 2003). Myers et al. (2003) identified a single ecological zone (Columbia Gorge) containing two historical demographically independent populations in this subbasin (Upper Gorge Tributaries and Lower Gorge Tributaries). The Lower Gorge Tributaries population has been classified by the TRT as a "core" population (i.e., historically abundant and "may offer the most likely path to recovery") as well as a genetic legacy population (i.e., one of "the most intact representatives of the genetic character of the ESU") (McElhany et al. 2003).

After reviewing the best available scientific data for all of the areas within the freshwater and estuarine range of this ESU, the CHART concluded that all of the occupied areas in this subbasin contain one or more PCEs for this ESU. Table G1 summarizes the total number of occupied reaches identified for each HUC5 watershed as containing spawning, rearing, or migration PCEs, as well as management activities that may affect the PCEs in the watersheds. Map G1 depicts the specific areas in this subbasin occupied by the ESU and under consideration for critical habitat designation. The CHART also determined that all of the occupied HUC5 watersheds in this subbasin were of high conservation value to the ESU. The CHART noted that two HUC5s (Middle Columbia/Eagle Creek

and Middle Columbia/Grays Creek) contain a high value rearing and migration corridor in the Columbia River connecting high value upstream watersheds with downstream reaches and the ocean. Table G2 summarizes the CHART's PCE/watershed scores and initial conservation value ratings, and Figure G1 shows the overall distribution of ratings by HUC5 watershed

Unit 2. Lower Columbia/Sandy Subbasin (HUC4# 17080001)

The Lower Columbia/Sandy subbasin is located in the western portion of the Columbia River gorge of Oregon and Washington. Occupied watersheds in this subbasin are contained in Multnomah County, Oregon, and Clark and Skamania counties in Washington. The subbasin contains nine watersheds, three of which are occupied by this ESU. Occupied watersheds encompass approximately 571 mi² and 277 miles of streams. This subbasin contains some of the principal spawning habitat for the entire ESU (e.g., in Hardy and Hamilton creeks and adjacent areas of the mainstem Columbia River). Fish distribution and habitat use data from the Washington Department of Fish and Wildlife (WDFW) identify approximately 84 miles of occupied riverine habitat in the watersheds, including a 26-mile segment of the Columbia River (ODFW 2003a,b; WDFW 2003). Myers et al. (2003) identified two ecological zones (Cascade and Columbia Gorge) containing three historical demographically independent populations in this subbasin: Lower Gorge Tributaries, Washougal River, and Salmon Creek. The Lower Gorge Tributaries population has been classified by the TRT as a "core" population (i.e., historically abundant and "may offer the most likely path to recovery") as well as a genetic legacy population (i.e., one of "the most intact representatives of the genetic character of the ESU") (McElhany et al. 2003).

After reviewing the best available scientific data for all of the areas within the freshwater and estuarine range of this ESU, the CHART concluded that all of the occupied areas in this subbasin contain one or more PCEs for this ESU. Table G1 summarizes the total number of occupied reaches identified for each HUC5 watershed as containing spawning, rearing, or migration PCEs, as well as management activities that may affect the PCEs in the watersheds. Map G2 depicts the specific areas in this subbasin occupied by the ESU and under consideration for critical habitat designation. The CHART also determined that all of the occupied HUC5 watersheds in this subbasin are of high conservation value to the ESU. The CHART also noted that the Columbia Gorge Tributaries HUC5, in addition to the key mainstem spawning areas, also contains a high value rearing and migration corridor in the Columbia River connecting high value upstream watersheds with downstream reaches and the ocean. Table G2 summarizes the CHART's

PCE/watershed scores and initial conservation value ratings, and Figure G1 shows the overall distribution of ratings by HUC5 watershed.

Unit 3. Lewis Subbasin (HUC4# 17080002)

The Lewis subbasin is located in southwest Washington and contained in Clark, Cowlitz, and Skamania counties (a very small and unoccupied portion in the uppermost watershed is contained in Yakima County). The subbasin contains six watersheds, two of which are currently occupied by this ESU and the remaining four are now blocked by Merwin Dam and others upstream. Occupied watersheds encompass approximately 456 mi² and 255 miles of streams. Fish distribution and habitat use data from the Washington Department of Fish and Wildlife (WDFW) identify approximately 71 miles of occupied riverine habitat in the watersheds (WDFW 2003). Myers et al. (2003) identified a single ecological zone (Cascade) containing one historical demographically independent population in this subbasin (Lewis River). The TRT has classified this as a “core” population (historically abundant and “may offer the most likely path to recovery”) and the East Fork Lewis River summer-run population as a genetic legacy population (one of “the most intact representatives of the genetic character of the ESU”) (McElhany et al. 2003).

After reviewing the best available scientific data for all of the areas within the freshwater and estuarine range of this ESU, the CHART concluded that all of the occupied areas in this subbasin contain one or more PCEs for this ESU. Table G1 summarizes the total number of occupied reaches identified for each HUC5 watershed as containing spawning, rearing, or migration PCEs, as well as management activities that may affect the PCEs in the watersheds. Map G3 depicts the specific areas in this subbasin occupied by the ESU and under consideration for critical habitat designation. The CHART also determined that both of the occupied HUC5 watersheds in this subbasin were of high conservation value to the ESU. Table G2 summarizes the CHART’s PCE/watershed scores and initial conservation value ratings, and Figure G1 shows the overall distribution of ratings by HUC5 watershed.

Unit 4. Lower Columbia/Clatskanie Subbasin (HUC4# 17080003)

The Lower Columbia/Clatskanie subbasin is located in southwest Washington and northwest Oregon. This subbasin contains six watersheds, three of which are occupied by this ESU and encompass approximately 543 square miles. Occupied watersheds in this subbasin are contained in Cowlitz, Lewis, Skamania, and Wahkiakum counties in Washington. Occupied watersheds encompasses approximately 543 mi² and 267 miles of streams. Fish distribution and habitat use data from the Washington Department of Fish and Wildlife (WDFW) identify approximately 51 miles of occupied riverine habitat in

these watersheds (WDFW 2003). Myers et al. (2003) identified two ecological zones (Coast Range and Cascade) containing five historical demographically independent populations in this subbasin: Kalama River, Mill Creek, Elochoman River, Clatskanie River, and Scappoose River. The Elochoman River population has been classified by the TRT as a “core” population, i.e., historically abundant and “may offer the most likely path to recovery” (McElhany et al. 2003).

After reviewing the best available scientific data for all of the areas within the freshwater and estuarine range of this ESU, the CHART concluded that all of the occupied areas in this subbasin contain one or more PCEs for this ESU. Table G1 summarizes the total number of occupied reaches identified for each HUC5 watershed as containing spawning, rearing, or migration PCEs, as well as management activities that may affect the PCEs in the watershed. Map G4 depicts the specific areas in this subbasin occupied by the ESU and under consideration for critical habitat designation. The CHART also determined that all of the occupied HUC5 watersheds in this subbasin of high conservation value to the ESU. Table G2 summarizes the CHART’s PCE/watershed scores and initial conservation value ratings, and Figure G1 shows the overall distribution of ratings by HUC5 watershed.

Unit 5. Lower Cowlitz Subbasin (HUC4# 17080005)

The Lower Cowlitz subbasin is located in southwest Washington and contained in Cowlitz, Lewis, and Skamania counties. The subbasin contains eight watersheds, six of which are occupied by this ESU. Occupied watersheds encompass approximately 1,102 mi² and 492 miles of streams. Fish distribution and habitat use data from the Washington Department of Fish and Wildlife (WDFW) identify approximately 243 miles of occupied riverine habitat in the watersheds (WDFW 2003). Myers et al. (2003) identified one ecological zone (Cascade) containing a single historical demographically independent population (Cowlitz River) of chum salmon in this subbasin. This population has been classified by the TRT as a “core” population (i.e., historically abundant and “may offer the most likely path to recovery”) and a genetic legacy population (i.e., one of “the most intact representatives of the genetic character of the ESU”) (McElhany et al. 2003).

After reviewing the best available scientific data for all of the areas within the freshwater and estuarine range of this ESU, the CHART concluded that all of the occupied areas in this subbasin contain one or more PCEs for this ESU. Table G1 summarizes the total number of occupied reaches identified for each HUC5 watershed as containing spawning, rearing, or migration PCEs, as well as management activities that may affect the PCEs in the watersheds. Map G5 depicts the specific areas in this subbasin occupied by the ESU and under consideration for critical habitat designation. The CHART determined that the

occupied HUC5 watersheds in this subbasin were of high or medium conservation value to the ESU. Of the six HUC5s reviewed, three were rated as having high and three were rated as having medium conservation value to the ESU. The CHART also noted that two HUC5s (East Willapa and Cowlitz River) contained high value rearing and migration corridors connecting high value upstream watersheds with downstream reaches and the ocean. Table G2 summarizes the CHART's PCE/watershed scores and initial conservation value ratings, and Figure G1 shows the overall distribution of ratings by HUC5 watershed.

Unit 6. Lower Columbia Subbasin (HUC4# 17080006)

The Lower Columbia subbasin is located at the mouth of the Columbia River in southwest Washington and Northwest Oregon. Occupied watersheds in this subbasin are contained in Clatsop County, Oregon, and Lewis, Pacific, and Wahkiakum counties in Washington. The subbasin contains three watersheds, two of which (Grays Bay and Big Creek) are occupied by this ESU. Occupied watersheds encompass approximately 304 mi² and 138 miles of streams. Fish distribution and habitat use data from the Oregon Department of Fish and Wildlife (ODFW) and Washington Department of Fish and Wildlife (WDFW) identify approximately 62 miles of occupied riverine habitat in the watersheds (ODFW 2003a,b; WDFW 2003). The CHART received recent data from ODFW (R. Turner, NOAA Fisheries, personal communication) indicating that the Big Creek watershed is occupied by this ESU, even though ODFW data identifies these reaches as "historically occupied." Myers et al. (2003) identified a single ecological zone (Coast Range) containing three demographically independent populations in this subbasin (Grays and Chinook Rivers, Youngs Bay, and Big Creek). The Youngs Bay, Grays and Chinook Rivers, and Big Creek populations have been classified by the TRT as "core" populations, i.e., historically abundant and "may offer the most likely path to recovery" (McElhany et al. 2003). In addition, the TRT classified the Grays and Chinook Rivers population as a genetic legacy population, i.e., one of "the most intact representatives of the genetic character of the ESU."

After reviewing the best available scientific data for all of the areas within the freshwater and estuarine range of this ESU, the CHART concluded that all of the occupied areas in this subbasin contain one or more PCEs for this ESU. Table G1 summarizes the total number of occupied reaches identified for each HUC5 watershed as containing spawning, rearing, or migration PCEs, as well as management activities that may affect the PCEs in the watersheds. Map G6 depicts the specific areas in this subbasin occupied by the ESU and under consideration for critical habitat designation. The CHART also determined that the occupied HUC5 watersheds in this subbasin were of high conservation value to

the ESU. Table G2 summarizes the CHART's PCE/watershed scores and initial conservation value ratings, and Figure G1 shows the overall distribution of ratings by HUC5 watershed.

Unit 7. Lower Columbia River Corridor

For the purposes of describing units of critical habitat designation for this ESU, NOAA Fisheries defines the lower Columbia River corridor as that segment from the mouth of the Columbia River at the Pacific Ocean upstream to an imaginary line connecting the confluences of the Sandy River (Oregon) and Washougal River (Washington). This corridor overlaps with the following counties: Clatsop, Columbia, and Multnomah counties in Oregon, and Clark, Cowlitz, Pacific, and Wahkiakum counties in Washington. Fish distribution and habitat use data from WDFW identify approximately 118 miles of occupied riverine and estuarine habitat in this corridor (WDFW 2003). Table B1 summarizes the total number of occupied reaches in this corridor containing rearing or migration PCEs, as well as management activities that may affect the PCEs.

After reviewing the best available scientific data for all of the areas within the freshwater and estuarine range of this ESU, the CHART concluded that the lower Columbia River corridor was of high conservation value to the ESU. Other upstream reaches of the Columbia River corridor (within Units 1 and 2 above) are also high value for rearing/migration. The CHART noted that the lower Columbia River corridor connects every watershed and population in this ESU with the ocean and is used by rearing/migrating juveniles and migrating adults. The Columbia River estuary is a particularly important area for this ESU as both juveniles and adults make the critical physiological transition between life in freshwater and marine habitats (Marriott et al. 2002).

Marine Areas

NOAA Fisheries' analysis focused on freshwater and estuarine habitats upstream of the mouth of the Columbia River. While marine areas are occupied by this ESU, within this vast area the agency has not identified "specific areas within the geographical area occupied by the species . . . on which are found those physical or biological features . . . essential to the conservation of the species."

References and Sources of Information

References cited above as well as key reports and data sets reviewed by the CHART include the following:

Ames, J., G. Graves, C. Weller (editors). 2000. Summer Chum Salmon Conservation Initiative; An Implementation Plan to Recover Summer Chum in the Hood Canal

- and Strait of Juan de Fuca Region. Report for WDFW and Point-No-Point Treaty Tribes.
- Byrne, J. 2002a. Draft Lewis River Subbasin Summary. Report Prepared for the Northwest Power Planning Council, dated May 17, 2002. (Available at: <http://www.cbfwa.org/>)
- Byrne, J. 2002b. Draft Washougal River Subbasin Summary. Report Prepared for the Northwest Power Planning Council, dated May 17, 2002. (Available at: <http://www.cbfwa.org/>)
- City of Portland. 2003. Comments on NOAA Fisheries' advanced notice of proposed rulemaking. City of Portland, Oregon, Endangered Species Act Program. Letter dated November 12, 2003. (Available from NOAA Fisheries Protected Resources Division, Portland, Oregon)
- Dammers, W. 2002. Draft Cowlitz River Subbasin Summary. Report Prepared for the Northwest Power Planning Council, dated May 17, 2002. (Available at: <http://www.cbfwa.org/>)
- Ehlke, R. and K. Keller. 2003. 2002 Chum Salmon Spawning Ground Surveys on the Mainstem Columbia and its Washington Tributaries. Prepared for Bonneville Power Administration (Contract No. BPA-00004287) by Pacific States Marine Fisheries Commission, Report dates September 2003.
- Forest Ecosystem Management Assessment Team (FEMAT). 1993. Forest ecosystem management: an ecological, economic, and social assessment. Report of the Forest Ecosystem Management Assessment Team. U.S. Government Printing Office 1993-793-071.
- Fulton, L. 1970. Spawning areas and abundance of steelhead trout and coho, sockeye, and chum salmon in the Columbia River basin – past and present. National Marine Fisheries Service Special Scientific Report – Fisheries No. 618, December 1970.
- Haring, D. 2003. Addendum to Wind/White Salmon Water Resource Inventory Area 29, Salmon and Steelhead Habitat Limiting Factors Analysis. Washington State Department of Ecology.
- Kostow, K. (editor). 1995. Biennial Report on the Status of Wild Fish in Oregon. OR. Dep. Fish Wildl. Rep., 217 p. + app. December 1995. (Available at: <http://www.dfw.state.or.us/>)

- Johnson, O.W., W.S. Grant, R.G. Kope, K. Neely, F.W. Waknitz, and R.S. Waples. 1997. Status review of chum salmon from Washington, Oregon, and California. U.S. Dept. Commerce, NOAA Tech. Memo. NMFS-NWFSC-32, 280 p.
- Lower Columbia Fish Recovery Board (LCFRB). 2003. Draft Lower Columbia Recovery Plan Technical Foundation. Working draft dated July 22, 2003. (Available from <http://www.lcfrb.gen.wa.us>)
- Marriott, D., and 27 contributors. 2002. Lower Columbia River and Columbia River Estuary Subbasin Summary. Report Prepared for the Northwest Power Planning Council, dated May 17, 2002. (Available at: <http://www.cbfgwa.org/>)
- McElhany, P., T. Backman, C. Busack, S. Heppell, S. Kolmes, A. Maule, J. Myers, D. Rawding, D. Shively, and C. Steward. 2002. Willamette/Lower Columbia Pacific salmonid viability criteria. Draft report from the Willamette/Lower Columbia Technical Recovery Team. December 2002.
- Myers, J., R. Kope, B. Bryant, D. Teel, L. Liehr, T. Wainwright, W. Grant, F. Waknitz, K. Neely, S. Lindley, and R. Waples. 1998. Status review of chinook salmon from Washington, Idaho, Oregon, and California. U.S. Dep. Commer., NOAA Tech. Memo NMFS-NWFSC-35, 443 p.
- Myers, J., C. Busack, D. Rawding, and A. Marshall. 2003. Historical population structure of Willamette and lower Columbia River basin Pacific salmonids. Willamette/Lower Columbia River Technical Recovery Team report. (October 2003). (Available at http://www.nwfsc.noaa.gov/trt/popid_report.htm)
- NOAA Fisheries. 2003. Preliminary conclusions regarding the updated status of listed ESUs of West Coast salmon and steelhead. Report of the West Coast Salmon Biological Review Team dated February 19, 2003.
- Northwest Power Planning Council. 1990. Presence/absence database from Northwest Power Planning Council's subbasin planning process. (Available at www.streamnet.org)
- Oregon Department of Fish and Wildlife. 2003a. Oregon Salmon and Steelhead Habitat Distribution. Natural Resources Information Management Program. (Available at: <http://rainbow.dfw.state.or.us/nrimp/>)
- Oregon Department of Fish and Wildlife. 2003b. Oregon Salmon and Steelhead Habitat Distribution at 1:24,000 Scale. Natural Resources Information Management Program. (Available at: <http://rainbow.dfw.state.or.us/nrimp/>)

- Rawding, D. 2000a. Draft Little White Salmon River Subbasin Summary. Report Prepared for the Northwest Power Planning Council, dated November 15, 2000. (Available at: <http://www.cbfwa.org/>)
- Rawding, D. 2000b. Draft White Salmon River Subbasin Summary. Report Prepared for the Northwest Power Planning Council, dated November 15, 2000. (Available at: <http://www.cbfwa.org/>)
- Rawding, D. 2000c. Draft Wind River Subbasin Summary. Report Prepared for the Northwest Power Planning Council, dated November 15, 2000. (Available at: <http://www.cbfwa.org/>)
- Roler, R. 2000a. Draft Elochoman River Subbasin Summary. Report Prepared for the Northwest Power Planning Council, dated May 17, 2002. (Available at: <http://www.cbfwa.org/>)
- Roler, R. 2000b. Draft Grays River Subbasin Summary. Report Prepared for the Northwest Power Planning Council, dated May 17, 2002. (Available at: <http://www.cbfwa.org/>)
- Salo, E.O. 1991. Life history of chum salmon, *Oncorhynchus keta*. In C. Groot and L. Margolis (editors), Pacific salmon life histories, p. 231-309. Univ. B.C. Press, Vancouver, B.C.
- Wade, G. 2000a. Salmon and Steelhead Habitat Limiting Factors, WRIA 26 (Cowlitz). Washington State Department of Ecology.
- Wade, G. 2000b. Salmon and Steelhead Habitat Limiting Factors, WRIA 27 (Lewis). Washington State Department of Ecology.
- Wade, G. 2001. Salmon and Steelhead Habitat Limiting Factors, WRIA 28 (Salmon-Washougal). Washington State Department of Ecology.
- Wade, G. 2002. Salmon and Steelhead Habitat Limiting Factors, WRIA 25 (Grays-Elochoman). Washington State Department of Ecology.
- Washington Department of Fish and Wildlife (WDFW) and Western Washington Treaty Indian Tribes (WWTIT). 1993. 1993 Washington State salmon and steelhead stock inventory (SASSI). WDFW, Olympia, WA, 212p.
- Washington Department of Fish and Wildlife (WDFW). 2003. "Fishdist: 1:24,000 (24K) and 1:100,000 (100K) Statewide Salmonid Fish Distribution". GIS data layer. (M. Hudson, data manager). Available from Washington Department of Fish and Wildlife, 600 Capitol Way N, Olympia WA 98501-1091.

Weinheimer, J. 2002. Draft Kalama River Subbasin Summary. Report Prepared for the Northwest Power Planning Council, dated May 17, 2002. (Available at: <http://www.cbfwa.org/>)

Table G1. Summary of Occupied Areas, PCEs, and Management Activities Affecting PCEs for the Columbia River Chum Salmon ESU

| Map Code | Subbasin | Watershed/ Corridor | HUC5 Code | Spawning / Rearing PCEs (mi) | Rearing/ Migration PCEs (mi) | Presence/ Migration Only PCEs (mi)* | Management Activities** |
|--------------------|----------------------------|-----------------------------|------------|------------------------------|------------------------------|-------------------------------------|-------------------------|
| G1 | Middle Columbia/Hood | White Salmon River | 1707010509 | 0.0 | 0.0 | 3.4 | A, C, D, F, R, U |
| G1 | Middle Columbia/Hood | Middle Columbia/Grays Creek | 1707010512 | 0.0 | 0.0 | 13.8 | R, U |
| G1 | Middle Columbia/Hood | Middle Columbia/Eagle Creek | 1707010513 | 0.0 | 0.0 | 9.3 | D, R, U |
| G2 | Lower Columbia/Sandy | Washougal River | 1708000106 | 0.0 | 0.0 | 15.2 | C, F, R, S, U, W |
| G2 | Lower Columbia/Sandy | Columbia Gorge Tributaries | 1708000107 | 8.5 | 0.1 | 41.5 | C, D, F, R, U, W |
| G2 | Lower Columbia/Sandy | Salmon Creek | 1708000109 | 0.2 | 0.0 | 20.3 | A, C, F, R, U, W |
| G3 | Lewis | East Fork Lewis River | 1708000205 | 0.0 | 0.0 | 44.1 | A, C, F, R, S, U, W |
| G3 | Lewis | Lower Lewis River | 1708000206 | 0.0 | 0.0 | 27.1 | A, C, D, F, R, U, W |
| G4 | Lower Columbia/ Clatskanie | Kalama River | 1708000301 | 0.0 | 0.0 | 9.0 | C, F, R, U, W |
| G4 | Lower Columbia/ Clatskanie | Germany/Abernathy | 1708000304 | 0.0 | 0.0 | 7.4 | A, C, F, R, U, W |
| G4 | Lower Columbia/ Clatskanie | Skamokawa/ Elochoman | 1708000305 | 3.4 | 8.0 | 24.0 | A, C, F, R, W |
| G5 | Cowlitz | Jackson Prairie | 1708000503 | 0.0 | 0.0 | 78.7 | A, C, D, F, R |
| G5 | Cowlitz | North Fork Toutle River | 1708000504 | 0.0 | 0.0 | 0.5 | F, R |
| G5 | Cowlitz | Green River | 1708000505 | 0.0 | 0.0 | 2.8 | F, R |
| G5 | Cowlitz | South Fork Toutle River | 1708000506 | 0.0 | 0.0 | 9.4 | F, R |
| G5 | Cowlitz | East Willapa | 1708000507 | 0.0 | 0.0 | 74.9 | A, C, F, R, U, W |
| G5 | Cowlitz | Coweeman | 1708000508 | 0.0 | 0.0 | 76.8 | A, C, F, R, U, W |
| G6 | Lower Columbia | Big Creek | 1708000602 | 0.0 | 0.0 | 6.0 | A, C, F, I, R, W |
| G6 | Lower Columbia | Grays Bay | 1708000603 | 6.8 | 17.8 | 31.7 | C, F, R, W |

| | | | | | | | |
|--|----------|----------------------------------|----|-----|-----|-----|---------------------|
| | Multiple | Lower Columbia River corridor | NA | 0.0 | 121 | 0.0 | C, D, I, R, T, U, W |
|--|----------|----------------------------------|----|-----|-----|-----|---------------------|

* Some streams classified as “Presence/Migration Only PCEs” may also include rearing or spawning PCEs, but the GIS data are still undergoing review to confirm species use type.

** This list is not exhaustive. It is intended to highlight key management activities affecting PCEs in each watershed. Activities identified are based on the general categories described by Spence et al. (1996) and summarized previously in the “Special Management Considerations or Protection” section of this report. Coding is as follows: F= forestry, G = grazing, A = agriculture, C = channel modifications/diking, R = road building/maintenance, U = urbanization, S = sand and gravel mining, M = mineral mining, D = dams, I = irrigation impoundments and withdrawals, T = river, estuary, and ocean traffic, W = wetland loss/removal, B = beaver removal, X = exotic/invasive species introductions, H = forage fish/species harvest. Primary sources for this information were the CHART and reports by LCFRB (2003), Subbasin Summary Reports of the NWPPC, and land use/land cover GIS layers from the U.S. Geological Survey.

Table G2. Summary of Initial CHART Scores and Ratings of Conservation Value for Habitat Areas in HUC5 Watersheds Occupied by the Columbia River Chum Salmon ESU

| Map Code | Subbasin | Watershed/ Corridor | HUC5 Code | Total HUC5 Score (0-18) ⁹ | Comments/Other Considerations | Initial CHART Rating of Conservation Value |
|--------------------|----------------------|-----------------------------|------------|--------------------------------------|--|--|
| G1 | Middle Columbia/Hood | White Salmon River | 1707010509 | 8 | Moderate HUC5 score; CHART concluded that there were no low conservation value HUC5s since ESU as a whole has extremely limited distribution of spawning/rearing PCEs; recent evidence of spawning in the Big White Salmon River may be the only extant production within the range of the TRT's historical Upper Gorge Tributaries population | High |
| G1 | Middle Columbia/Hood | Middle Columbia/Grays Creek | 1707010512 | 8 | Moderate HUC5 score; CHART concluded that there were no low conservation value HUC5s since ESU as a whole has extremely limited distribution of spawning/rearing PCEs; no tributary or spawning habitat identified in this HUC5 but CHART concluded that Columbia River rearing/migration PCEs in this HUC5 downstream from Big White Salmon River are of high conservation value to the ESU | High |
| G1 | Middle Columbia/Hood | Middle Columbia/Eagle Creek | 1707010513 | 8 | Moderate HUC5 score; CHART concluded that there were no low conservation value HUC5s since ESU as a whole has extremely limited distribution of spawning/rearing PCEs; no tributary or spawning habitat identified but CHART concluded that Columbia River rearing/migration PCEs in this HUC5 are of high conservation value to the ESU | High |

⁹ PCE/watershed scores were derived using the CHART scoring process described in the introduction to this report. The CHART employed an earlier 5-factor version of the scoring matrix for three ESUs (Columbia River chum salmon and Upper Willamette River chinook salmon and steelhead) therefore the maximum possible score for these ESUs was 15 points.

| Map Code | Subbasin | Watershed/ Corridor | HUC5 Code | Total HUC5 Score (0-18) ⁹ | Comments/Other Considerations | Initial CHART Rating of Conservation Value |
|--------------------|----------------------|----------------------------|------------|--------------------------------------|---|--|
| G2 | Lower Columbia/Sandy | Washougal River | 1708000106 | 9 | Moderate HUC5 score; CHART concluded that there were no low conservation value HUC5s since ESU as a whole has extremely limited distribution of spawning/rearing PCEs; this HUC5 is near mainstem Columbia River spawning area and may contain important rearing PCEs; LaCamas Creek noted as having seeps or springs that may be important for this ESU | High |
| G2 | Lower Columbia/Sandy | Columbia Gorge Tributaries | 1708000107 | 14 | High HUC5 score; CHART concluded that there were no low conservation value HUC5s since ESU as a whole has extremely limited distribution of spawning/rearing PCEs; this HUC5 within range of TRT historical Lower Gorge Tributaries population and contains essential tributary spawning sites as well as mainstem Columbia River spawning sites in the vicinity of Hardy and Hamilton creeks and downstream near Camas, WA; HUC5 also contains important springs/seeps and is a high value Columbia River rearing/migration corridor for the ESU | High |
| G2 | Lower Columbia/Sandy | Salmon Creek | 1708000109 | 11 | Moderate-high HUC5 score; CHART concluded that there were no low conservation value HUC5s since ESU as a whole has extremely limited distribution of spawning/rearing PCEs; this HUC5 is believed to contain some spawning/rearing habitat; HUC5 includes entire spawning range of a TRT historical population | High |

| Map Code | Subbasin | Watershed/ Corridor | HUC5 Code | Total HUC5 Score (0-18) ⁹ | Comments/Other Considerations | Initial CHART Rating of Conservation Value |
|--------------------|----------------------------|-----------------------|------------|--------------------------------------|--|--|
| G3 | Lewis | East Fork Lewis River | 1708000205 | 9 | Moderate HUC5 score; CHART concluded that there were no low conservation value HUC5s since ESU as a whole has extremely limited distribution of spawning/rearing PCEs; HUC5 is one of two supporting a TRT historical core population; East Fork Lewis River noted as having seeps or springs that may be important for this ESU | High |
| G3 | Lewis | Lower Lewis River | 1708000206 | 11 | Moderate-high HUC5 score; CHART concluded that there were no low conservation value HUC5s since ESU as a whole has extremely limited distribution of spawning/rearing PCEs; HUC5 is one of two supporting a TRT historical core population | High |
| G4 | Lower Columbia/ Clatskanie | Kalama River | 1708000301 | 11 | Moderate-high HUC5 score; CHART concluded that there were no low conservation value HUC5s since ESU as a whole has extremely limited distribution of spawning/rearing PCEs; HUC5 includes entire spawning range of a TRT historical population | High |
| G4 | Lower Columbia/ Clatskanie | Germany/ Abernathy | 1708000304 | 10 | Moderate HUC5 score; CHART concluded that there were no low conservation value HUC5s since ESU as a whole has extremely limited distribution of spawning/rearing PCEs; one of only four HUC5s with tributary PCEs in the Coast Range region; HUC5 includes entire spawning range of a TRT historical population; Mill, Germany, and Abernathy creeks noted as having seeps or springs that may be important for this ESU | High |

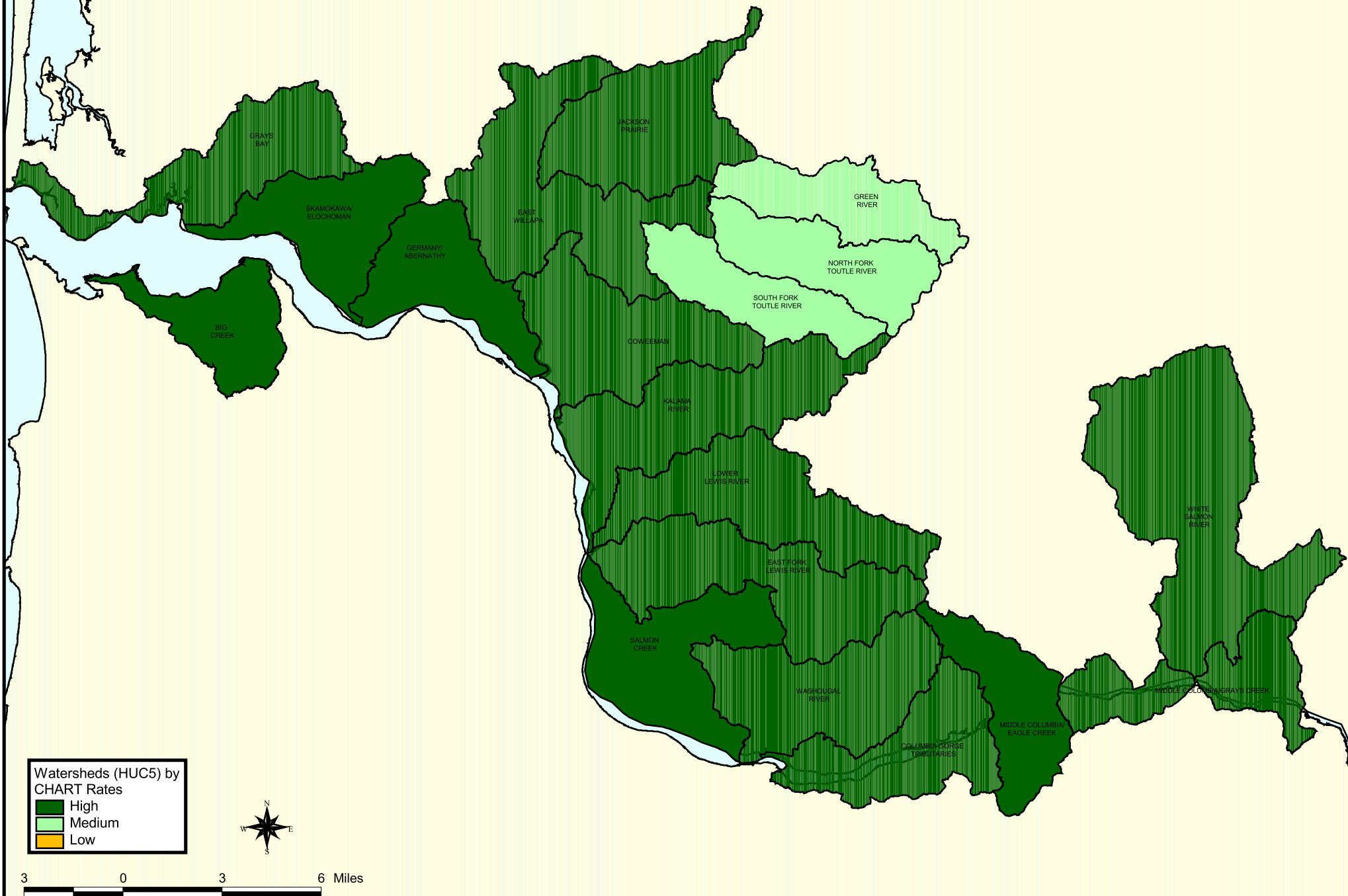
| Map Code | Subbasin | Watershed/ Corridor | HUC5 Code | Total HUC5 Score (0-18) ⁹ | Comments/Other Considerations | Initial CHART Rating of Conservation Value |
|--------------------|----------------------------|-------------------------|------------|--------------------------------------|--|--|
| G4 | Lower Columbia/ Clatskanie | Skamokawa/ Elochoman | 1708000305 | 10 | Moderate HUC5 score; CHART concluded that there were no low conservation value HUC5s since ESU as a whole has extremely limited distribution of spawning/rearing PCEs; one of only four HUC5s with tributary PCEs in the Coast Range region; HUC5 includes entire spawning range of a TRT historical population; Skamokawa Creek noted as having seeps or springs that may be important for this ESU | High |
| G5 | Cowlitz | Jackson Prairie | 1708000503 | 10 | Moderate HUC5 score; CHART concluded that there were no low conservation value HUC5s since ESU as a whole has extremely limited distribution of spawning/rearing PCEs; one of at least three HUC5s supporting a TRT historical core population and PCEs are relatively extensive here | High |
| G5 | Cowlitz | North Fork Toutle River | 1708000504 | 6 | Low-Moderate HUC5 score; CHART concluded that there were no low conservation value HUC5s since ESU as a whole has extremely limited distribution of spawning/rearing PCEs (and this HUC5 has one of the lowest) | Medium |
| G5 | Cowlitz | Green River | 1708000505 | 7 | Moderate HUC5 score; CHART concluded that there were no low conservation value HUC5s since ESU as a whole has extremely limited distribution of spawning/rearing PCEs (and this HUC5 has one of the lowest) | Medium |
| G5 | Cowlitz | South Fork Toutle River | 1708000506 | 7 | Moderate HUC5 score; CHART concluded that there were no low conservation value HUC5s since ESU as a whole has extremely limited distribution of spawning/rearing PCEs (and this HUC5 has one of the lowest) | Medium |

| Map Code | Subbasin | Watershed/ Corridor | HUC5 Code | Total HUC5 Score (0-18) ⁹ | Comments/Other Considerations | Initial CHART Rating of Conservation Value |
|--------------------|----------------|---------------------|------------|--------------------------------------|--|--|
| G5 | Cowlitz | East Willapa | 1708000507 | 10 | Moderate HUC5 score; CHART concluded that there were no low conservation value HUC5s since ESU as a whole has extremely limited distribution of spawning/rearing PCEs; one of at least three HUC5s supporting a TRT historical core population and PCEs are relatively extensive here; HUC5 also contains important connectivity corridor for a high-value upstream HUC5 | High |
| G5 | Cowlitz | Coweeman | 1708000508 | 10 | Moderate HUC5 score; CHART concluded that there were no low conservation value HUC5s since ESU as a whole has extremely limited distribution of spawning/rearing PCEs; one of at least three HUC5s supporting a TRT historical core population and PCEs are relatively extensive here; HUC5 also contains important connectivity corridor for a high-value upstream HUC5 | High |
| G6 | Lower Columbia | Big Creek | 1708000602 | 11 | Moderate-high HUC5 score; CHART concluded that there were no low conservation value HUC5s since ESU as a whole has extremely limited distribution of spawning/rearing PCEs; one of only four HUC5s with tributary PCEs in the Coast Range region; HUC5 includes entire spawning range of a TRT historical population | High |
| G6 | Lower Columbia | Grays Bay | 1708000603 | 14 | Highest HUC5 score for entire range of ESU; CHART concluded that there were no low conservation value HUC5s since ESU as a whole has extremely limited distribution of spawning/rearing PCEs; one of only four HUC5s with tributary PCEs in the Coast Range region; HUC5 includes entire spawning range of a TRT historical population | High |

| Map Code | Subbasin | Watershed/ Corridor | HUC5 Code | Total HUC5 Score (0-18) ⁹ | Comments/Other Considerations | Initial CHART Rating of Conservation Value |
|----------|----------|-------------------------------|-----------|--------------------------------------|--|--|
| | Multiple | Lower Columbia River corridor | NA | NA | Area not scored since many reaches are outside HUC5 boundaries. However, the CHART concluded that rearing and migration PCEs throughout this corridor are highly essential to ESU conservation | High |

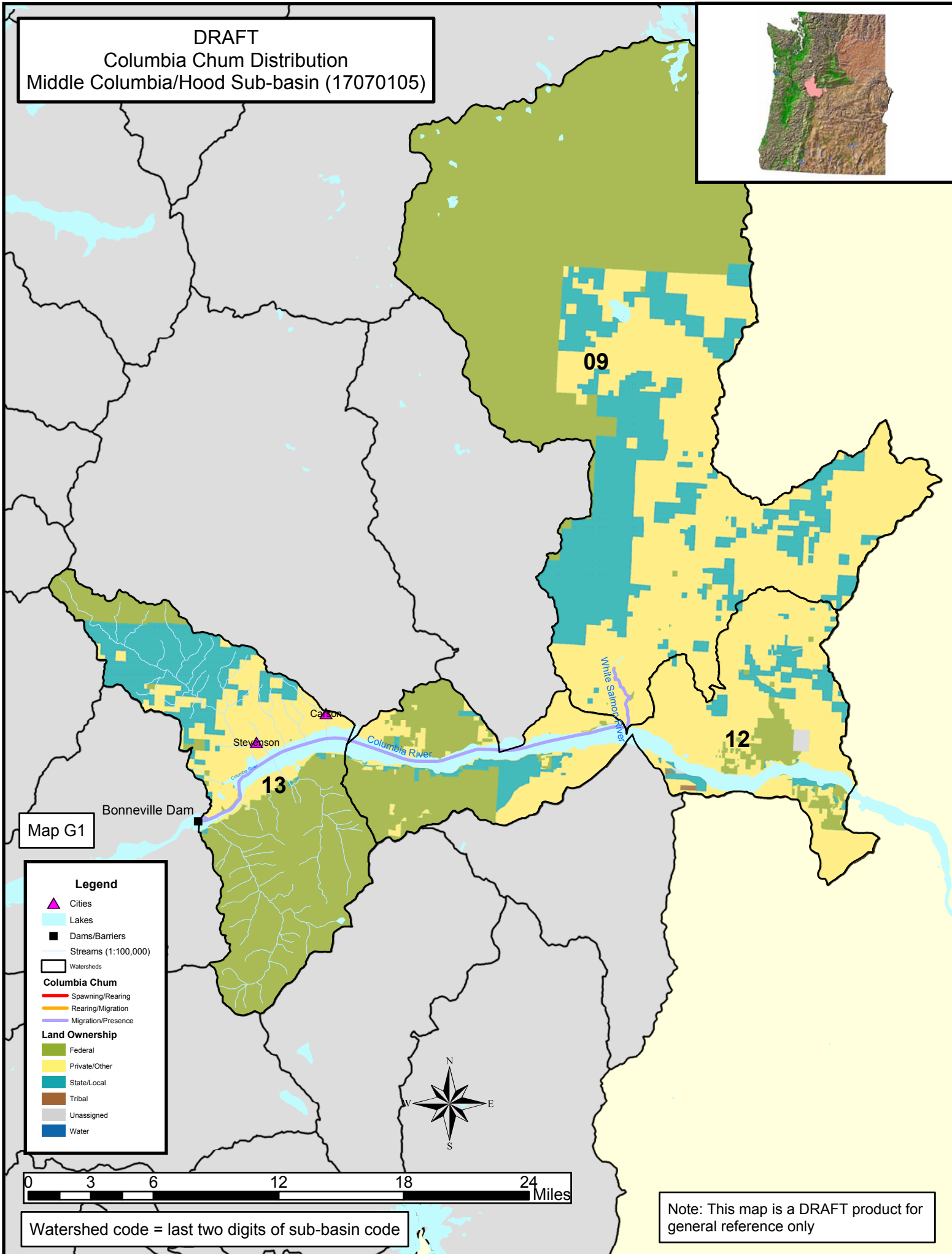
Figure G1. Initial CHART Ratings of Conservation Value for Habitat Areas in HUC5 Watersheds Occupied by the Columbia River Chum Salmon ESU

DRAFT
Columbia Chum
CHART Watershed Ratings



Maps G1 through G6. Columbia River Chum Salmon ESU – Habitat Areas Under Consideration for Critical Habitat Designation (note: the Columbia River corridor is not shown but is under consideration as described in the text)

DRAFT
Columbia Chum Distribution
Middle Columbia/Hood Sub-basin (17070105)



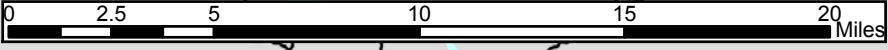
DRAFT
Columbia Chum Distribution
Lower Columbia/Sandy Sub-basin (17080001)



Map G2

Legend

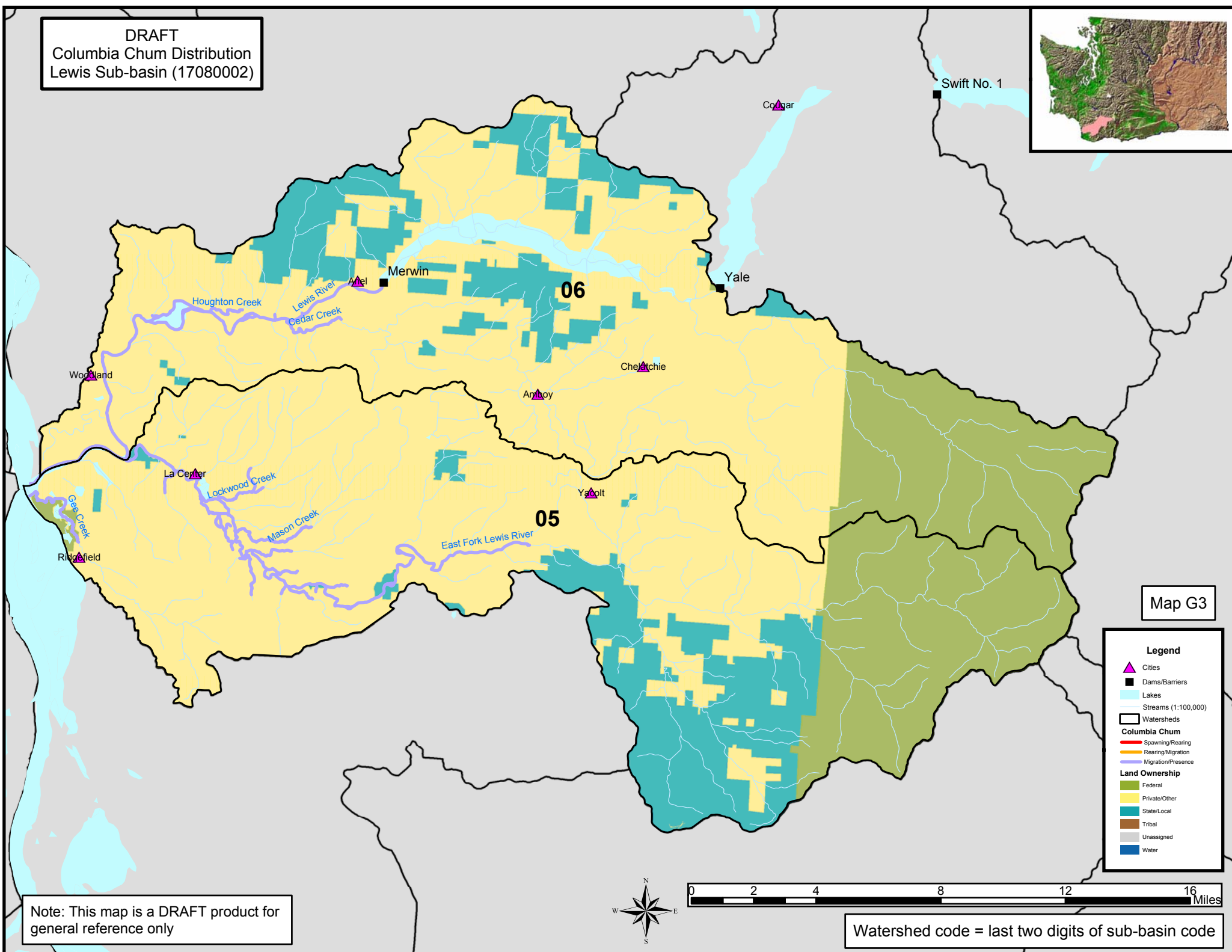
- Cities
- Dams/Barriers
- Streams (1:100,000)
- Lakes
- Watersheds
- Columbia Chum**
 - Spawning/Rearing
 - Rearing/Migration
 - Migration/Presence
- Land Ownership**
 - Federal
 - Private/Other
 - State/Local
 - Tribal
 - Unassigned
 - Water



Watershed code = last two digits of sub-basin code

Note: This map is a DRAFT product for general reference only

DRAFT
Columbia Chum Distribution
Lewis Sub-basin (17080002)

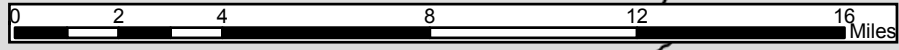


Map G3

Legend

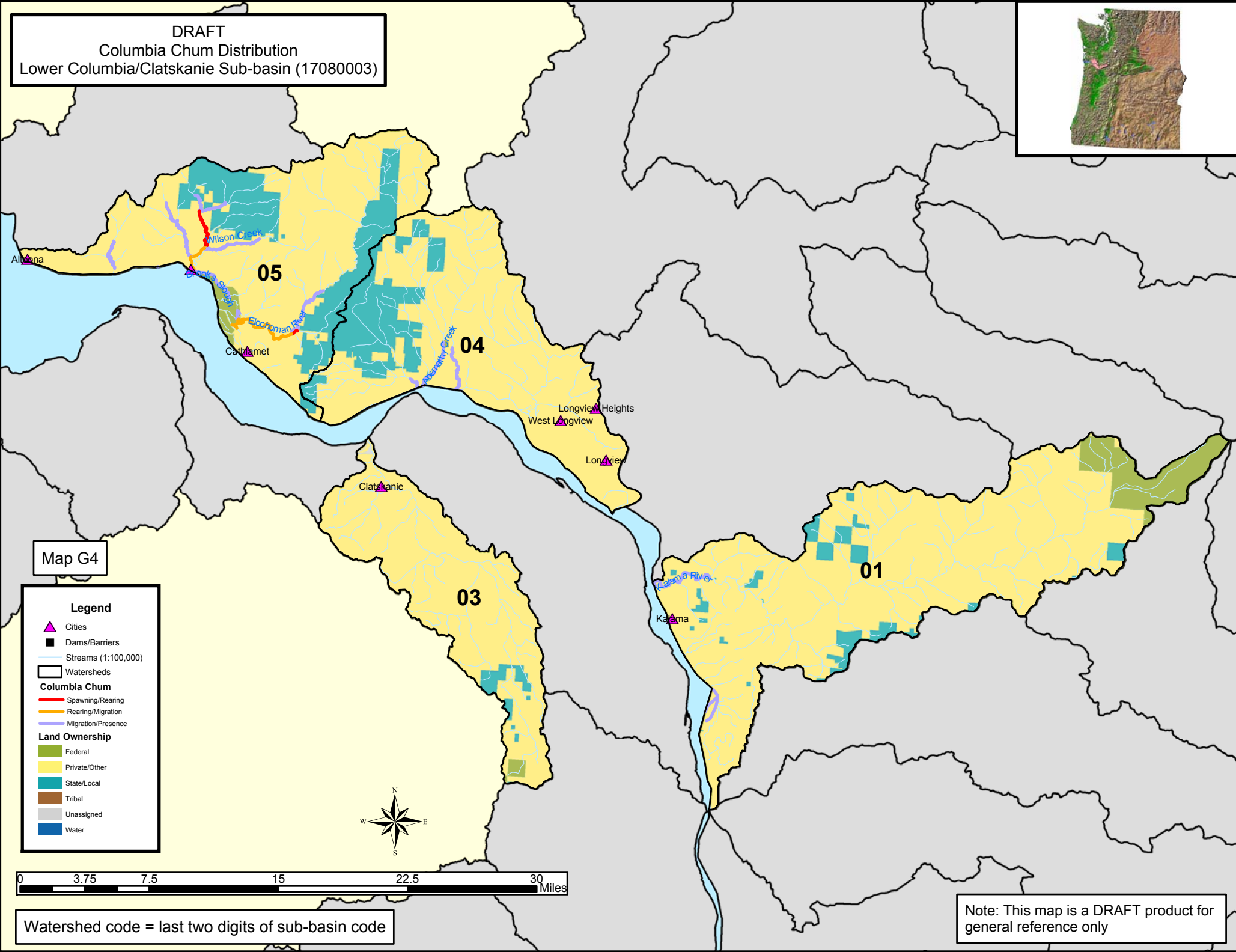
- Cities
- Dams/Barriers
- Lakes
- Streams (1:100,000)
- Watersheds
- Columbia Chum**
 - Spawning/Rearing
 - Rearing/Migration
 - Migration/Presence
- Land Ownership**
 - Federal
 - Private/Other
 - State/Local
 - Tribal
 - Unassigned
 - Water

Note: This map is a DRAFT product for general reference only



Watershed code = last two digits of sub-basin code

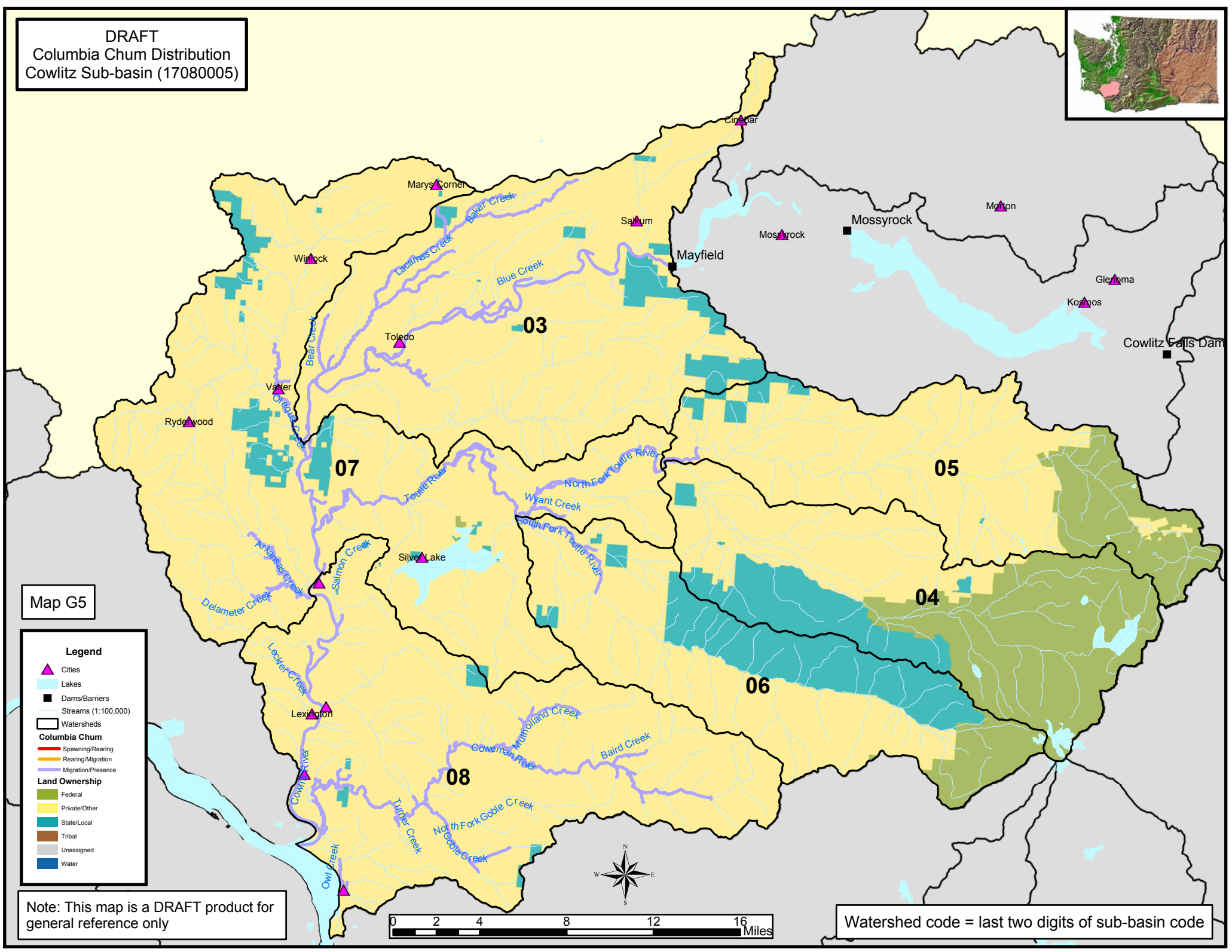
DRAFT
Columbia Chum Distribution
Lower Columbia/Clatskanie Sub-basin (17080003)



Watershed code = last two digits of sub-basin code

Note: This map is a DRAFT product for general reference only

DRAFT
Columbia Chum Distribution
Cowlitz Sub-basin (17080005)



DRAFT
Columbia Chum Distribution
Lower Columbia Sub-basin (17080006)



Map G6

Legend

- Cities
- Streams (1:100,000)
- Watersheds

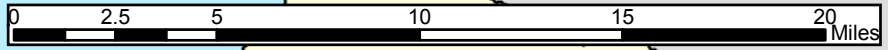
Columbia Chum

- Spawning/Rearing
- Rearing/Migration
- Migration/Presence

Land Ownership

- Federal
- Private/Other
- State/Local
- Tribal
- Unassigned
- Water

■ bar_pts_alb



Watershed code = last two digits of sub-basin code

Note: This map is a DRAFT product for general reference only